

# SEQUENCE LISTING

<110> Crooke et al.

<120> ANTISENSE MODULATION OF APOLIPOPROTEIN B EXPRESSION

<130> 30566/39662

<150> US 60/426,234

<151> 2002-11-13

<150> PCT/US03/15493

<151> 2003-05-13

<160> 892

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<213> Homo sapiens

<220>

<221> CDS

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Pro Ala Leu Leu Leu Leu Leu Ala Gly Ala Arg Ala Glu Glu Glu  
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Gly Val Pro Gly Thr Ala Asp Ser Arg Ser Ala Thr Arg Ile Asn Cys	
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Lys Val Glu Leu Glu Val Pro Gln Leu Cys Ser Phe Ile Leu Lys Thr	
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Ala Leu Leu Lys Lys Thr Lys Asn Ser Glu Glu Phe Ala Ala Met	
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Val	Ala	Leu	Ile	Pro	Glu	Pro	Ser	Ala	Gln	Gln	Leu	Arg	Glu	Ile	Phe		
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Asn	Met	Ala	Arg	Asp	Gln	Arg	Ser	Arg	Ala	Thr	Leu	Tyr	Ala	Leu	Ser		
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His	Ala	Val	Asn	Asn	Tyr	His	Lys	Thr	Asn	Pro	Thr	Gly	Thr	Gln	Glu		
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Lys Thr Ser Tyr Arg Leu Thr Leu Asp Ile Gln Asn Lys Lys Ile Thr	
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Met Gly Ser Tyr Ala Glu Met Lys Phe Asp His Thr Asn Ser Leu Asn	
1745 1750 1755	
att gca ggc tta tca ctg gac ttc tct tca aaa ctt gac aac att tac	5450
Ile Ala Gly Leu Ser Leu Asp Phe Ser Ser Lys Leu Asp Asn Ile Tyr	
1760 1765 1770	
agc tct gac aag ttt tat aag caa act gtt aat tta cag cta cag ccc	5498
Ser Ser Asp Lys Phe Tyr Lys Gln Thr Val Asn Leu Gln Leu Gln Pro	



1775	1780	1785	1790	
tat tct ctg gta act act tta aac agt gac ctg aaa tac aat gct ctg				5546
Tyr Ser Leu Val Thr Thr Leu Asn Ser Asp Leu Lys Tyr Asn Ala Leu	1795	1800	1805	
gat ctc acc aac aat ggg aaa cta cgg cta gaa ccc ctg aag ctg cat				5594
Asp Leu Thr Asn Asn Gly Lys Leu Arg Leu Glu Pro Leu Lys Leu His	1810	1815	1820	
gtg gct ggt aac cta aaa gga gcc tac caa aat aat gaa ata aaa cac				5642
Val Ala Gly Asn Leu Lys Gly Ala Tyr Gln Asn Asn Glu Ile Lys His	1825	1830	1835	
atc tat gcc atc tct tct gct gcc tta tca gca agc tat aaa gca gac				5690
Ile Tyr Ala Ile Ser Ser Ala Ala Leu Ser Ala Ser Tyr Lys Ala Asp	1840	1845	1850	
act gtt gct aag gtt cag ggt gtg gag ttt agc cat cgg ctc aac aca				5738
Thr Val Ala Lys Val Gln Gly Val Glu Phe Ser His Arg Leu Asn Thr	1855	1860	1865	1870
gac atc gct ggg ctg gct tca gcc att gac atg agc aca aac tat aat				5786
Asp Ile Ala Gly Leu Ala Ser Ala Ile Asp Met Ser Thr Asn Tyr Asn	1875	1880	1885	
tca gac tca ctg cat ttc agc aat gtc ttc cgt tct gta atg gcc ccg				5834
Ser Asp Ser Leu His Phe Ser Asn Val Phe Arg Ser Val Met Ala Pro	1890	1895	1900	
ttt acc atg acc atc gat gca cat aca aat ggc aat ggg aaa ctc gct				5882
Phe Thr Met Thr Ile Asp Ala His Thr Asn Gly Asn Gly Lys Leu Ala	1905	1910	1915	
ctc tgg gga gaa cat act ggg cag ctg tat agc aaa ttc ctg ttg aaa				5930
Leu Trp Gly Glu His Thr Gly Gln Leu Tyr Ser Lys Phe Leu Leu Lys	1920	1925	1930	
gca gaa cct ctg gca ttt act ttc tct cat gat tac aaa ggc tcc aca				5978
Ala Glu Pro Leu Ala Phe Thr Phe Ser His Asp Tyr Lys Gly Ser Thr	1935	1940	1945	1950
agt cat cat ctc gtg tct agg aaa agc atc agt gca gct ctt gaa cac				6026
Ser His His Leu Val Ser Arg Lys Ser Ile Ser Ala Ala Leu Glu His	1955	1960	1965	
aaa gtc agt gcc ctg ctt act cca gct gag cag aca ggc acc tgg aaa				6074
Lys Val Ser Ala Leu Leu Thr Pro Ala Glu Gln Thr Gly Thr Trp Lys	1970	1975	1980	
ctc aag acc caa ttt aac aac aat gaa tac agc cag gac ttg gat gct				6122
Leu Lys Thr Gln Phe Asn Asn Asn Glu Tyr Ser Gln Asp Leu Asp Ala	1985	1990	1995	
tac aac act aaa gat aaa att ggc gtg gag ctt act gga cga act ctg				6170
Tyr Asn Thr Lys Asp Lys Ile Gly Val Glu Leu Thr Gly Arg Thr Leu	2000	2005	2010	
gct gac cta act cta cta gac tcc cca att aaa gtg cca ctt tta ctc				6218
Ala Asp Leu Thr Leu Leu Asp Ser Pro Ile Lys Val Pro Leu Leu Leu	2015	2020	2025	2030
agt gag ccc atc aat atc att gat gct tta gag atg aga gat gcc gtt				6266

Ser	Glu	Pro	Ile	Asn	Ile	Ile	Asp	Ala	Leu	Glu	Met	Arg	Asp	Ala	Val		
				2035					2040					2045			
gag	aag	ccc	caa	gaa	ttt	aca	att	gtt	gct	ttt	gta	aag	tat	gat	aaa	6314	
Glu	Lys	Pro	Gln	Glu	Phe	Thr	Ile	Val	Ala	Phe	Val	Lys	Tyr	Asp	Lys		
			2050					2055				2060					
aac	caa	gat	gtt	cac	tcc	att	aac	ctc	cca	ttt	ttt	gag	acc	ttg	caa	6362	
Asn	Gln	Asp	Val	His	Ser	Ile	Asn	Leu	Pro	Phe	Phe	Glu	Thr	Leu	Gln		
		2065					2070					2075					
gaa	tat	ttt	gag	agg	aat	cga	caa	acc	att	ata	gtt	gta	gtg	gaa	aac	6410	
Glu	Tyr	Phe	Glu	Arg	Asn	Arg	Gln	Thr	Ile	Ile	Val	Val	Val	Glu	Asn		
	2080					2085				2090							
gta	cag	aga	aac	ctg	aag	cac	atc	aat	att	gat	caa	ttt	gta	aga	aaa	6458	
Val	Gln	Arg	Asn	Leu	Lys	His	Ile	Asn	Ile	Asp	Gln	Phe	Val	Arg	Lys		
2095				2100				2105					2110				
tac	aga	gca	gcc	ctg	gga	aaa	ctc	cca	cag	caa	gct	aat	gat	tat	ctg	6506	
Tyr	Arg	Ala	Ala	Leu	Gly	Lys	Leu	Pro	Gln	Gln	Ala	Asn	Asp	Tyr	Leu		
			2115					2120					2125				
aat	tca	ttc	aat	tgg	gag	aga	caa	gtt	tca	cat	gcc	aag	gag	aaa	ctg	6554	
Asn	Ser	Phe	Asn	Trp	Glu	Arg	Gln	Val	Ser	His	Ala	Lys	Glu	Lys	Leu		
			2130					2135				2140					
act	gct	ctc	aca	aaa	aag	tat	aga	att	aca	gaa	aat	gat	ata	caa	att	6602	
Thr	Ala	Leu	Thr	Lys	Lys	Tyr	Arg	Ile	Thr	Glu	Asn	Asp	Ile	Gln	Ile		
	2145						2150					2155					
gca	tta	gat	gat	gcc	aaa	atc	aac	ttt	aat	gaa	aaa	cta	tct	caa	ctg	6650	
Ala	Leu	Asp	Asp	Ala	Lys	Ile	Asn	Phe	Asn	Glu	Lys	Leu	Ser	Gln	Leu		
	2160					2165				2170							
cag	aca	tat	atg	ata	caa	ttt	gat	cag	tat	att	aaa	gat	agt	tat	gat	6698	
Gln	Thr	Tyr	Met	Ile	Gln	Phe	Asp	Gln	Tyr	Ile	Lys	Asp	Ser	Tyr	Asp		
2175				2180				2185					2190				
tta	cat	gat	ttg	aaa	ata	gct	att	gct	aat	att	att	gat	gaa	atc	att	6746	
Leu	His	Asp	Leu	Lys	Ile	Ala	Ile	Ala	Asn	Ile	Ile	Asp	Glu	Ile	Ile		
			2195					2200				2205					
gaa	aaa	tta	aaa	agt	ctt	gat	gag	cac	tat	cat	atc	cgt	gta	aat	tta	6794	
Glu	Lys	Leu	Lys	Ser	Leu	Asp	Glu	His	Tyr	His	Ile	Arg	Val	Asn	Leu		
		2210					2215					2220					
gta	aaa	aca	atc	cat	gat	cta	cat	ttg	ttt	att	gaa	aat	att	gat	ttt	6842	
Val	Lys	Thr	Ile	His	Asp	Leu	His	Leu	Phe	Ile	Glu	Asn	Ile	Asp	Phe		
		2225				2230					2235						
aac	aaa	agt	gga	agt	agt	act	gca	tcc	tgg	att	caa	aat	gtg	gat	act	6890	
Asn	Lys	Ser	Gly	Ser	Ser	Thr	Ala	Ser	Trp	Ile	Gln	Asn	Val	Asp	Thr		
	2240					2245				2250							
aag	tac	caa	atc	aga	atc	cag	ata	caa	gaa	aaa	ctg	cag	cag	ctt	aag	6938	
Lys	Tyr	Gln	Ile	Arg	Ile	Gln	Ile	Gln	Glu	Lys	Leu	Gln	Gln	Leu	Lys		
2255				2260				2265				2270					
aga	cac	ata	cag	aat	ata	gac	atc	cag	cac	cta	gct	gga	aag	tta	aaa	6986	
Arg	His	Ile	Gln	Asn	Ile	Asp	Ile	Gln	His	Leu	Ala	Gly	Lys	Leu	Lys		
			2275					2280				2285					

caa cac att gag gct att gat gtt aga gtg ctt tta gat caa ttg gga	7034
Gln His Ile Glu Ala Ile Asp Val Arg Val Leu Leu Asp Gln Leu Gly	
2290 2295 2300	
act aca att tca ttt gaa aga ata aat gat gtt ctt gag cat gtc aaa	7082
Thr Thr Ile Ser Phe Glu Arg Ile Asn Asp Val Leu Glu His Val Lys	
2305 2310 2315	
cac ttt gtt ata aat ctt att ggg gat ttt gaa gta gct gag aaa atc	7130
His Phe Val Ile Asn Leu Ile Gly Asp Phe Glu Val Ala Glu Lys Ile	
2320 2325 2330	
aat gcc ttc aga gcc aaa gtc cat gag tta atc gag agg tat gaa gta	7178
Asn Ala Phe Arg Ala Lys Val His Glu Leu Ile Glu Arg Tyr Glu Val	
2335 2340 2345 2350	
gac caa caa atc cag gtt tta atg gat aaa tta gta gag ttg acc cac	7226
Asp Gln Gln Ile Gln Val Leu Met Asp Lys Leu Val Glu Leu Thr His	
2355 2360 2365	
caa tac aag ttg aag gag act att cag aag cta agc aat gtc cta caa	7274
Gln Tyr Lys Leu Lys Glu Thr Ile Gln Lys Leu Ser Asn Val Leu Gln	
2370 2375 2380	
caa gtt aag ata aaa gat tac ttt gag aaa ttg gtt gga ttt att gat	7322
Gln Val Lys Ile Lys Asp Tyr Phe Glu Lys Leu Val Gly Phe Ile Asp	
2385 2390 2395	
gat gct gtg aag aag ctt aat gaa tta tct ttt aaa aca ttc att gaa	7370
Asp Ala Val Lys Lys Leu Asn Glu Leu Ser Phe Lys Thr Phe Ile Glu	
2400 2405 2410	
gat gtt aac aaa ttc ctt gac atg ttg ata aag aaa tta aag tca ttt	7418
Asp Val Asn Lys Phe Leu Asp Met Leu Ile Lys Lys Leu Lys Ser Phe	
2415 2420 2425 2430	
gat tac cac cag ttt gta gat gaa acc aat gac aaa atc cgt gag gtg	7466
Asp Tyr His Gln Phe Val Asp Glu Thr Asn Asp Lys Ile Arg Glu Val	
2435 2440 2445	
act cag aga ctc aat ggt gaa att cag gct ctg gaa cta cca caa aaa	7514
Thr Gln Arg Leu Asn Gly Glu Ile Gln Ala Leu Glu Leu Pro Gln Lys	
2450 2455 2460	
gct gaa gca tta aaa ctg ttt tta gag gaa acc aag gcc aca gtt gca	7562
Ala Glu Ala Leu Lys Leu Phe Leu Glu Glu Thr Lys Ala Thr Val Ala	
2465 2470 2475	
gtg tat ctg gaa agc cta cag gac acc aaa ata acc tta atc atc aat	7610
Val Tyr Leu Glu Ser Leu Gln Asp Thr Lys Ile Thr Leu Ile Ile Asn	
2480 2485 2490	
tgg tta cag gag gct tta agt tca gca tct ttg gct cac atg aag gcc	7658
Trp Leu Gln Glu Ala Leu Ser Ser Ala Ser Leu Ala His Met Lys Ala	
2495 2500 2505 2510	
aaa ttc cga gag act cta gaa gat aca cga gac cga atg tat caa atg	7706
Lys Phe Arg Glu Thr Leu Glu Asp Thr Arg Asp Arg Met Tyr Gln Met	
2515 2520 2525	
gac att cag cag gaa ctt caa cga tac ctg tct ctg gta ggc cag gtt	7754

Asp Ile Gln Gln Glu Leu Gln Arg Tyr Leu Ser Leu Val Gly Gln Val	
2530 2535 2540	
tat agc aca ctt gtc acc tac att tct gat tgg tgg act ctt gct gct	7802
Tyr Ser Thr Leu Val Thr Tyr Ile Ser Asp Trp Trp Thr Leu Ala Ala	
2545 2550 2555	
aag aac ctt act gac ttt gca gag caa tat tct atc caa gat tgg gct	7850
Lys Asn Leu Thr Asp Phe Ala Glu Gln Tyr Ser Ile Gln Asp Trp Ala	
2560 2565 2570	
aaa cgt atg aaa gca ttg gta gag caa ggg ttc act gtt cct gaa atc	7898
Lys Arg Met Lys Ala Leu Val Glu Gln Gly Phe Thr Val Pro Glu Ile	
2575 2580 2585 2590	
aag acc atc ctt ggg acc atg cct gcc ttt gaa gtc agt ctt cag gct	7946
Lys Thr Ile Leu Gly Thr Met Pro Ala Phe Glu Val Ser Leu Gln Ala	
2595 2600 2605	
ctt cag aaa gct acc ttc cag aca cct gat ttt ata gtc ccc cta aca	7994
Leu Gln Lys Ala Thr Phe Gln Thr Pro Asp Phe Ile Val Pro Leu Thr	
2610 2615 2620	
gat ttg agg att cca tca gtt cag ata aac ttc aaa gac tta aaa aat	8042
Asp Leu Arg Ile Pro Ser Val Gln Ile Asn Phe Lys Asp Leu Lys Asn	
2625 2630 2635	
ata aaa atc cca tcc agg ttt tcc aca cca gaa ttt acc atc ctt aac	8090
Ile Lys Ile Pro Ser Arg Phe Ser Thr Pro Glu Phe Thr Ile Leu Asn	
2640 2645 2650	
acc ttc cac att cct tcc ttt aca att gac ttt gtc gaa atg aaa gta	8138
Thr Phe His Ile Pro Ser Phe Thr Ile Asp Phe Val Glu Met Lys Val	
2655 2660 2665 2670	
aag atc atc aga acc att gac cag atg cag aac agt gag ctg cag tgg	8186
Lys Ile Ile Arg Thr Ile Asp Gln Met Gln Asn Ser Glu Leu Gln Trp	
2675 2680 2685	
ccc gtt cca gat ata tat ctc agg gat ctg aag gtg gag gac att cct	8234
Pro Val Pro Asp Ile Tyr Leu Arg Asp Leu Lys Val Glu Asp Ile Pro	
2690 2695 2700	
cta gcg aga atc acc ctg cca gac ttc cgt tta cca gaa atc gca att	8282
Leu Ala Arg Ile Thr Leu Pro Asp Phe Arg Leu Pro Glu Ile Ala Ile	
2705 2710 2715	
cca gaa ttc ata atc cca act ctc aac ctt aat gat ttt caa gtt cct	8330
Pro Glu Phe Ile Ile Pro Thr Leu Asn Leu Asn Asp Phe Gln Val Pro	
2720 2725 2730	
gac ctt cac ata cca gaa ttc cag ctt ccc cac atc tca cac aca att	8378
Asp Leu His Ile Pro Glu Phe Gln Leu Pro His Ile Ser His Thr Ile	
2735 2740 2745 2750	
gaa gta cct act ttt ggc aag cta tac agt att ctg aaa atc caa tct	8426
Glu Val Pro Thr Phe Gly Lys Leu Tyr Ser Ile Leu Lys Ile Gln Ser	
2755 2760 2765	
cct ctt ttc aca tta gat gca aat gct gac ata ggg aat gga acc acc	8474
Pro Leu Phe Thr Leu Asp Ala Asn Ala Asp Ile Gly Asn Gly Thr Thr	

2770						2775						2780						
tca	gca	aac	gaa	gca	ggg	atc	gca	gct	tcc	atc	act	gcc	aaa	gga	gag	8522		
Ser	Ala	Asn	Glu	Ala	Gly	Ile	Ala	Ala	Ser	Ile	Thr	Ala	Lys	Gly	Glu			
2785						2790						2795						
tcc	aaa	tta	gaa	gtt	ctc	aat	ttt	gat	ttt	caa	gca	aat	gca	caa	ctc	8570		
Ser	Lys	Leu	Glu	Val	Leu	Asn	Phe	Asp	Phe	Gln	Ala	Asn	Ala	Gln	Leu			
2800						2805						2810						
tca	aac	cct	aag	att	aat	ccg	ctg	gct	ctg	aag	gag	tca	gtg	aag	ttc	8618		
Ser	Asn	Pro	Lys	Ile	Asn	Pro	Leu	Ala	Leu	Lys	Glu	Ser	Val	Lys	Phe			
2815						2820						2825			2830			
tcc	agc	aag	tac	ctg	aga	acg	gag	cat	ggg	agt	gaa	atg	ctg	ttt	ttt	8666		
Ser	Ser	Lys	Tyr	Leu	Arg	Thr	Glu	His	Gly	Ser	Glu	Met	Leu	Phe	Phe			
			2835						2840						2845			
gga	aat	gct	att	gag	gga	aaa	tca	aac	aca	gtg	gca	agt	tta	cac	aca	8714		
Gly	Asn	Ala	Ile	Glu	Gly	Lys	Ser	Asn	Thr	Val	Ala	Ser	Leu	His	Thr			
			2850						2855						2860			
gaa	aaa	aat	aca	ctg	gag	ctt	agt	aat	gga	gtg	att	gtc	aag	ata	aac	8762		
Glu	Lys	Asn	Thr	Leu	Glu	Leu	Ser	Asn	Gly	Val	Ile	Val	Lys	Ile	Asn			
2865						2870						2875						
aat	cag	ctt	acc	ctg	gat	agc	aac	act	aaa	tac	ttc	cac	aaa	ttg	aac	8810		
Asn	Gln	Leu	Thr	Leu	Asp	Ser	Asn	Thr	Lys	Tyr	Phe	His	Lys	Leu	Asn			
2880						2885						2890						
atc	ccc	aaa	ctg	gac	ttc	tct	agt	cag	gct	gac	ctg	cgc	aac	gag	atc	8858		
Ile	Pro	Lys	Leu	Asp	Phe	Ser	Ser	Gln	Ala	Asp	Leu	Arg	Asn	Glu	Ile			
2895						2900						2905			2910			
aag	aca	ctg	ttg	aaa	gct	ggc	cac	ata	gca	tgg	act	tct	tct	gga	aaa	8906		
Lys	Thr	Leu	Leu	Lys	Ala	Gly	His	Ile	Ala	Trp	Thr	Ser	Ser	Gly	Lys			
			2915						2920						2925			
ggg	tca	tgg	aaa	tgg	gcc	tgc	ccc	aga	ttc	tca	gat	gag	gga	aca	cat	8954		
Gly	Ser	Trp	Lys	Trp	Ala	Cys	Pro	Arg	Phe	Ser	Asp	Glu	Gly	Thr	His			
			2930						2935						2940			
gaa	tca	caa	att	agt	ttc	acc	ata	gaa	gga	ccc	ctc	act	tcc	ttt	gga	9002		
Glu	Ser	Gln	Ile	Ser	Phe	Thr	Ile	Glu	Gly	Pro	Leu	Thr	Ser	Phe	Gly			
2945						2950						2955						
ctg	tcc	aat	aag	atc	aat	agc	aaa	cac	cta	aga	gta	aac	caa	aac	ttg	9050		
Leu	Ser	Asn	Lys	Ile	Asn	Ser	Lys	His	Leu	Arg	Val	Asn	Gln	Asn	Leu			
2960						2965						2970						
gtt	tat	gaa	tct	ggc	tcc	ctc	aac	ttt	tct	aaa	ctt	gaa	att	caa	tca	9098		
Val	Tyr	Glu	Ser	Gly	Ser	Leu	Asn	Phe	Ser	Lys	Leu	Glu	Ile	Gln	Ser			
2975						2980						2985			2990			
caa	gtc	gat	tcc	cag	cat	gtg	ggc	cac	agt	gtt	cta	act	gct	aaa	ggc	9146		
Gln	Val	Asp	Ser	Gln	His	Val	G											

Ala His Leu Asn Gly Lys Val Ile Gly Thr Leu Lys Asn Ser Leu Phe	
3025 3030 3035	
ttt tca gcc cag cca ttt gag atc acg gca tcc aca aac aat gaa ggg	9290
Phe Ser Ala Gln Pro Phe Glu Ile Thr Ala Ser Thr Asn Asn Glu Gly	
3040 3045 3050	
aat ttg aaa gtt cgt ttt cca tta agg tta aca ggg aag ata gac ttc	9338
Asn Leu Lys Val Arg Phe Pro Leu Arg Leu Thr Gly Lys Ile Asp Phe	
3055 3060 3065 3070	
ctg aat aac tat gca ctg ttt ctg agt ccc agt gcc cag caa gca agt	9386
Leu Asn Asn Tyr Ala Leu Phe Leu Ser Pro Ser Ala Gln Gln Ala Ser	
3075 3080 3085	
tgg caa gta agt gct agg ttc aat cag tat aag tac aac caa aat ttc	9434
Trp Gln Val Ser Ala Arg Phe Asn Gln Tyr Lys Tyr Asn Gln Asn Phe	
3090 3095 3100	
tct gct gga aac aac gag aac att atg gag gcc cat gta gga ata aat	9482
Ser Ala Gly Asn Asn Glu Asn Ile Met Glu Ala His Val Gly Ile Asn	
3105 3110 3115	
gga gaa gca aat ctg gat ttc tta aac att cct tta aca att cct gaa	9530
Gly Glu Ala Asn Leu Asp Phe Leu Asn Ile Pro Leu Thr Ile Pro Glu	
3120 3125 3130	
atg cgt cta cct tac aca ata atc aca act cct cca ctg aaa gat ttc	9578
Met Arg Leu Pro Tyr Thr Ile Ile Thr Thr Pro Pro Leu Lys Asp Phe	
3135 3140 3145 3150	
tct cta tgg gaa aaa aca ggc ttg aag gaa ttc ttg aaa acg aca aag	9626
Ser Leu Trp Glu Lys Thr Gly Leu Lys Glu Phe Leu Lys Thr Thr Lys	
3155 3160 3165	
caa tca ttt gat tta agt gta aaa gct cag tat aag aaa aac aaa cac	9674
Gln Ser Phe Asp Leu Ser Val Lys Ala Gln Tyr Lys Lys Asn Lys His	
3170 3175 3180	
agg cat tcc atc aca aat cct ttg gct gtg ctt tgt gag ttt atc agt	9722
Arg His Ser Ile Thr Asn Pro Leu Ala Val Leu Cys Glu Phe Ile Ser	
3185 3190 3195	
cag agc atc aaa tcc ttt gac agg cat ttt gaa aaa aac aga aac aat	9770
Gln Ser Ile Lys Ser Phe Asp Arg His Phe Glu Lys Asn Arg Asn Asn	
3200 3205 3210	
gca tta gat ttt gtc acc aaa tcc tat aat gaa aca aaa att aag ttt	9818
Ala Leu Asp Phe Val Thr Lys Ser Tyr Asn Glu Thr Lys Ile Lys Phe	
3215 3220 3225 3230	
gat aag tac aaa gct gaa aaa tct cac gac gag ctc ccc agg acc ttt	9866
Asp Lys Tyr Lys Ala Glu Lys Ser His Asp Glu Leu Pro Arg Thr Phe	
3235 3240 3245	
caa att cct gga tac act gtt cca gtt gtc aat gtt gaa gtg tct cca	9914
Gln Ile Pro Gly Tyr Thr Val Pro Val Val Asn Val Glu Val Ser Pro	
3250 3255 3260	
ttc acc ata gag atg tcg gca ttc ggc tat gtg ttc cca aaa gca gtc	9962
Phe Thr Ile Glu Met Ser Ala Phe Gly Tyr Val Phe Pro Lys Ala Val	

3265	3270	3275	
agc atg cct agt ttc tcc atc cta ggt tct gac gtc cgt gtg cct tca Ser Met Pro Ser Phe Ser Ile Leu Gly Ser Asp Val Arg Val Pro Ser 3280 3285 3290			10010
tac aca tta atc ctg cca tca tta gag ctg cca gtc ctt cat gtc cct Tyr Thr Leu Ile Leu Pro Ser Leu Glu Leu Pro Val Leu His Val Pro 3295 3300 3305 3310			10058
aga aat ctc aag ctt tct ctt cca cat ttc aag gaa ttg tgt acc ata Arg Asn Leu Lys Leu Ser Leu Pro His Phe Lys Glu Leu Cys Thr Ile 3315 3320 3325			10106
agc cat att ttt att cct gcc atg ggc aat att acc tat gat ttc tcc Ser His Ile Phe Ile Pro Ala Met Gly Asn Ile Thr Tyr Asp Phe Ser 3330 3335 3340			10154
ttt aaa tca agt gtc atc aca ctg aat acc aat gct gaa ctt ttt aac Phe Lys Ser Ser Val Ile Thr Leu Asn Thr Asn Ala Glu Leu Phe Asn 3345 3350 3355			10202
cag tca gat att gtt gct cat ctc ctt tct tca tct tca tct gtc att Gln Ser Asp Ile Val Ala His Leu Leu Ser Ser Ser Ser Ser Val Ile 3360 3365 3370			10250
gat gca ctg cag tac aaa tta gag ggc acc aca aga ttg aca aga aaa Asp Ala Leu Gln Tyr Lys Leu Glu Gly Thr Thr Arg Leu Thr Arg Lys 3375 3380 3385 3390			10298
agg gga ttg aag tta gcc aca gct ctg tct ctg agc aac aaa ttt gtg Arg Gly Leu Lys Leu Ala Thr Ala Leu Ser Leu Ser Asn Lys Phe Val 3395 3400 3405			10346
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gtg tca gtg gca aaa acc aca aaa gcc gaa att cca att ttg aga atg Val Ser Val Ala Lys Thr Thr Lys Ala Glu Ile Pro Ile Leu Arg Met 3425 3430 3435			10442
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1 5 10 15

ctg ctg ctg ctg ctg ctg gcg ggc gcc agg gcc gaa gag gaa atg ctg 96  
Leu Leu Leu Leu Leu Leu Ala Gly Ala Arg Ala Glu Glu Glu Met Leu  
20 25 30

gaa aat gtc agc ctg gtc tgt cca aaa gat gcg acc cga ttc aag cac 144  
Glu Asn Val Ser Leu Val Cys Pro Lys Asp Ala Thr Arg Phe Lys His  
35 40 45

ctc cgg aag tac aca tac aac tat gag gct gag agt tcc agt gga gtc 192  
Leu Arg Lys Tyr Thr Tyr Asn Tyr Glu Ala Glu Ser Ser Ser Gly Val  
50 55 60

cct ggg act gct gat tca aga agt gcc acc agg atc aac tgc aag gtt 240  
Pro Gly Thr Ala Asp Ser Arg Ser Ala Thr Arg Ile Asn Cys Lys Val  
65 70 75 80

gag ctg gag gtt ccc cag ctc tgc agc ttc atc ctg aag acc agc cag 288  
Glu Leu Glu Val Pro Gln Leu Cys Ser Phe Ile Leu Lys Thr Ser Gln  
85 90 95

tgc acc ctg aaa gag gtg tat ggc ttc aac cct gag ggc aaa gcc ttg 336  
Cys Thr Leu Lys Glu Val Tyr Gly Phe Asn Pro Glu Gly Lys Ala Leu  
100 105 110

ctg aag aaa acc aag aac tct gag gag ttt gct gca gcc atg tcc agg 384  
Leu Lys Lys Thr Lys Asn Ser Glu Glu Phe Ala Ala Ala Met Ser Arg  
115 120 125

tat gag ctc aag ctg gcc att cca gaa ggg aag cag gtt ttc ctt tac 432  
Tyr Glu Leu Lys Leu Ala Ile Pro Glu Gly Lys Gln Val Phe Leu Tyr  
130 135 140

ccg gag aaa gat gaa cct act tac atc ctg aac atc aag agg ggc atc 480  
Pro Glu Lys Asp Glu Pro Thr Tyr Ile Leu Asn Ile Lys Arg Gly Ile  
145 150 155 160

att tct gcc ctc ctg gtt ccc cca gag aca gaa gaa gcc aag caa gtg Ile Ser Ala Leu Leu Val Pro Pro Glu Thr Glu Glu Ala Lys Gln Val	528
165 170 175	
ttg ttt ctg gat acc gtg tat gga aac tgc tcc act cac ttt acc gtc Leu Phe Leu Asp Thr Val Tyr Gly Asn Cys Ser Thr His Phe Thr Val	576
180 185 190	
aag acg agg aag ggc aat gtg gca aca gaa ata tcc act gaa aga gac Lys Thr Arg Lys Gly Asn Val Ala Thr Glu Ile Ser Thr Glu Arg Asp	624
195 200 205	
ctg ggg cag tgt gat cgc ttc aag ccc atc cgc aca ggc atc agc cca Leu Gly Gln Cys Asp Arg Phe Lys Pro Ile Arg Thr Gly Ile Ser Pro	672
210 215 220	
ctt gct ctc atc aaa ggc atg acc cgc ccc ttg tca act ctg atc agc Leu Ala Leu Ile Lys Gly Met Thr Arg Pro Leu Ser Thr Leu Ile Ser	720
225 230 235 240	
agc agc cag tcc tgt cag tac aca ctg gac gct aag agg aag cat gtg Ser Ser Gln Ser Cys Gln Tyr Thr Leu Asp Ala Lys Arg Lys His Val	768
245 250 255	
gca gaa gcc atc tgc aag gag caa cac ctc ttc ctg cct ttc tcc tac Ala Glu Ala Ile Cys Lys Glu Gln His Leu Phe Leu Pro Phe Ser Tyr	816
260 265 270	
aag aat aag tat ggg atg gta gca caa gtg aca cag act ttg aaa ctt Lys Asn Lys Tyr Gly Met Val Ala Gln Val Thr Gln Thr Leu Lys Leu	864
275 280 285	
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290 295 300	
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305 310 315 320	
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325 330 335	
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340 345 350	
act gag ctg aga ggc ctc agt gat gaa gca gtc aca tct ctc ttg cca Thr Glu Leu Arg Gly Leu Ser Asp Glu Ala Val Thr Ser Leu Leu Pro	1104
355 360 365	
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370 375 380	
tgt gga cag cct cag tgc tcc act cac atc ctc cag tgg ctg aaa cgt Cys Gly Gln Pro Gln Cys Ser Thr His Ile Leu Gln Trp Leu Lys Arg	1200
385 390 395 400	

gtg cat gcc aac ccc ctt ctg ata gat gtg gtc acc tac ctg gtg gcc	1248
Val His Ala Asn Pro Leu Leu Ile Asp Val Val Thr Tyr Leu Val Ala	
405 410 415	
ctg atc ccc gag ccc tca gca cag cag ctg cga gag atc ttc aac atg	1296
Leu Ile Pro Glu Pro Ser Ala Gln Gln Leu Arg Glu Ile Phe Asn Met	
420 425 430	
gcg agg gat cag cgc agc cga gcc acc ttg tat gcg ctg agc cac gcg	1344
Ala Arg Asp Gln Arg Ser Arg Ala Thr Leu Tyr Ala Leu Ser His Ala	
435 440 445	
gtc aac aac tat cat aag aca aac cct aca ggg acc cag gag ctg ctg	1392
Val Asn Asn Tyr His Lys Thr Asn Pro Thr Gly Thr Gln Glu Leu Leu	
450 455 460	
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Asp Ile Ala Asn Tyr Leu Met Glu Gln Ile Gln Asp Asp Cys Thr Gly	
465 470 475 480	
gat gaa gat tac acc tat ttg att ctg cgg gtc att gga aat atg ggc	1488
Asp Glu Asp Tyr Thr Tyr Leu Ile Leu Arg Val Ile Gly Asn Met Gly	
485 490 495	
caa acc atg gag cag tta act cca gaa ctc aag tct tca atc ctg aaa	1536
Gln Thr Met Glu Gln Leu Thr Pro Glu Leu Lys Ser Ser Ile Leu Lys	
500 505 510	
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Cys Val Gln Ser Thr Lys Pro Ser Leu Met Ile Gln Lys Ala Ala Ile	
515 520 525	
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Gln Ala Leu Arg Lys Met Glu Pro Lys Asp Lys Asp Gln Glu Val Leu	
530 535 540	
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Leu Gln Thr Phe Leu Asp Asp Ala Ser Pro Gly Asp Lys Arg Leu Ala	
545 550 555 560	
gcc tat ctt atg ttg atg agg agt cct tca cag gca gat att aac aaa	1728
Ala Tyr Leu Met Leu Met Arg Ser Pro Ser Gln Ala Asp Ile Asn Lys	
565 570 575	
att gtc caa att cta cca tgg gaa cag aat gag caa gtg aag aac ttt	1776
Ile Val Gln Ile Leu Pro Trp Glu Gln Asn Glu Gln Val Lys Asn Phe	
580 585 590	
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Val Ala Ser His Ile Ala Asn Ile Leu Asn Ser Glu Glu Leu Asp Ile	
595 600 605	
caa gat ctg aaa aag tta gtg aaa gaa gct ctg aaa gaa tct caa ctt	1872
Gln Asp Leu Lys Lys Leu Val Lys Glu Ala Leu Lys Glu Ser Gln Leu	
610 615 620	
cca act gtc atg gac ttc aga aaa ttc tct cgg aac tat caa ctc tac	1920
Pro Thr Val Met Asp Phe Arg Lys Phe Ser Arg Asn Tyr Gln Leu Tyr	
625 630 635 640	
aaa tct gtt tct ctt cca tca ctt gac cca gcc tca gcc aaa ata gaa	1968
Lys Ser Val Ser Leu Pro Ser Leu Asp Pro Ala Ser Ala Lys Ile Glu	
645 650 655	

ggg aat ctt ata ttt gat cca aat aac tac ctt cct aaa gaa agc atg	2016
Gly Asn Leu Ile Phe Asp Pro Asn Asn Tyr Leu Pro Lys Glu Ser Met	
660 665 670	
ctg aaa act acc ctc act gcc ttt gga ttt gct tca gct gac ctc atc	2064
Leu Lys Thr Thr Leu Thr Ala Phe Gly Phe Ala Ser Ala Asp Leu Ile	
675 680 685	
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Glu Ile Gly Leu Glu Gly Lys Gly Phe Glu Pro Thr Leu Glu Ala Pro	
690 695 700	
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Phe Gly Lys Gln Gly Phe Phe Pro Asp Ser Val Asn Lys Ala Leu Tyr	
705 710 715 720	
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Trp Val Asn Gly Gln Val Pro Asp Gly Val Ser Lys Val Leu Val Asp	
725 730 735	
cac ttt ggc tat acc aaa gat gat aaa cat gag cag gat atg gta aat	2256
His Phe Gly Tyr Thr Lys Asp Asp Lys His Glu Gln Asp Met Val Asn	
740 745 750	
gga ata atg ctc agt gtt gag aag ctg att aaa gat ttg aaa tcc aaa	2304
Gly Ile Met Leu Ser Val Glu Lys Leu Ile Lys Asp Leu Lys Ser Lys	
755 760 765	
gaa gtc ccg gaa gcc aga gcc tac ctc cgc atc ttg gga gag gag ctt	2352
Glu Val Pro Glu Ala Arg Ala Tyr Leu Arg Ile Leu Gly Glu Glu Leu	
770 775 780	
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Gly Phe Ala Ser Leu His Asp Leu Arg Leu Leu Gly Lys Leu Leu Leu	
785 790 795 800	
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Met Gly Ala Arg Thr Leu Gln Gly Ile Pro Gln Met Ile Gly Glu Val	
805 810 815	
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Ile Arg Lys Gly Ser Lys Asn Asp Phe Phe Leu His Tyr Ile Phe Met	
820 825 830	
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Glu Asn Ala Phe Glu Leu Pro Thr Gly Ala Gly Leu Gln Leu Gln Ile	
835 840 845	
tct tca tct gga gtc att gct ccc gga gcc aag gct gga gta aaa ctg	2592
Ser Ser Ser Gly Val Ile Ala Pro Gly Ala Lys Ala Gly Val Lys Leu	
850 855 860	
gaa gta gcc aac atg cag gct gaa ctg gtg gca aaa ccc tcc gtg tct	2640
Glu Val Ala Asn Met Gln Ala Glu Leu Val Ala Lys Pro Ser Val Ser	
865 870 875 880	
gtg gag ttt gtg aca aat atg ggc atc atc att ccg gac ttc gct agg	2688
Val Glu Phe Val Thr Asn Met Gly Ile Ile Ile Pro Asp Phe Ala Arg	
885 890 895	

agt ggg gtc cag atg aac acc aac ttc ttc cac gag tcg ggt ctg gag	2736
Ser Gly Val Gln Met Asn Thr Asn Phe Phe His Glu Ser Gly Leu Glu	
900 905 910	
gct cat gtt gcc cta aaa gct ggg aag ctg aag ttt atc att cct tcc	2784
Ala His Val Ala Leu Lys Ala Gly Lys Leu Lys Phe Ile Ile Pro Ser	
915 920 925	
cca aag aga cca gtc aag ctg ctc agt gga ggc aac aca tta cat ttg	2832
Pro Lys Arg Pro Val Lys Leu Leu Ser Gly Gly Asn Thr Leu His Leu	
930 935 940	
gtc tct acc acc aaa acg gag gtc atc cca cct ctc att gag aac agg	2880
Val Ser Thr Thr Lys Thr Glu Val Ile Pro Pro Leu Ile Glu Asn Arg	
945 950 955 960	
cag tcc tgg tca gtt tgc aag caa gtc ttt cct ggc ctg aat tac tgc	2928
Gln Ser Trp Ser Val Cys Lys Gln Val Phe Pro Gly Leu Asn Tyr Cys	
965 970 975	
acc tca ggc gct tac tcc aac gcc agc tcc aca gac tcc gcc tcc tac	2976
Thr Ser Gly Ala Tyr Ser Asn Ala Ser Ser Thr Asp Ser Ala Ser Tyr	
980 985 990	
tat ccg ctg acc ggg gac acc aga tta gag ctg gaa ctg agg cct aca	3024
Tyr Pro Leu Thr Gly Asp Thr Arg Leu Glu Leu Glu Leu Arg Pro Thr	
995 1000 1005	
gga gag att gag cag tat tct gtc agc gca acc tat gag ctc cag aga	3072
Gly Glu Ile Glu Gln Tyr Ser Val Ser Ala Thr Tyr Glu Leu Gln Arg	
1010 1015 1020	
gag gac aga gcc ttg gtg gat acc ctg aag ttt gta act caa gca gaa	3120
Glu Asp Arg Ala Leu Val Asp Thr Leu Lys Phe Val Thr Gln Ala Glu	
1025 1030 1035 1040	
ggc gcg aag cag act gag gct acc atg aca ttc aaa tat aat cgg cag	3168
Gly Ala Lys Gln Thr Glu Ala Thr Met Thr Phe Lys Tyr Asn Arg Gln	
1045 1050 1055	
agt atg acc ttg tcc agt gaa gtc caa att ccg gat ttt gat gtt gac	3216
Ser Met Thr Leu Ser Ser Glu Val Gln Ile Pro Asp Phe Asp Val Asp	
1060 1065 1070	
ctc gga aca atc ctc aga gtt aat gat gaa tct act gag ggc aaa acg	3264
Leu Gly Thr Ile Leu Arg Val Asn Asp Glu Ser Thr Glu Gly Lys Thr	
1075 1080 1085	
tct tac aga ctc acc ctg gac att cag aac aag aaa att act gag gtc	3312
Ser Tyr Arg Leu Thr Leu Asp Ile Gln Asn Lys Lys Ile Thr Glu Val	
1090 1095 1100	
gcc ctc atg ggc cac cta agt tgt gac aca aag gaa gaa aga aaa atc	3360
Ala Leu Met Gly His Leu Ser Cys Asp Thr Lys Glu Glu Arg Lys Ile	
1105 1110 1115 1120	
aag ggt gtt att tcc ata ccc cgt ttg caa gca gaa gcc aga agt gag	3408
Lys Gly Val Ile Ser Ile Pro Arg Leu Gln Ala Glu Ala Arg Ser Glu	
1125 1130 1135	
atc ctc gcc cac tgg tcg cct gcc aaa ctg ctt ctc caa atg gac tca	3456
Ile Leu Ala His Trp Ser Pro Ala Lys Leu Leu Leu Gln Met Asp Ser	
1140 1145 1150	



tct gct aca gct tat ggc tcc aca gtt tcc aag agg gtg gca tgg cat	3504
Ser Ala Thr Ala Tyr Gly Ser Thr Val Ser Lys Arg Val Ala Trp His	
1155 1160 1165	
tat gat gaa gag aag att gaa ttt gaa tgg aac aca ggc acc aat gta	3552
Tyr Asp Glu Glu Lys Ile Glu Phe Glu Trp Asn Thr Gly Thr Asn Val	
1170 1175 1180	
gat acc aaa aaa atg act tcc aat ttc cct gtg gat ctc tcc gat tat	3600
Asp Thr Lys Lys Met Thr Ser Asn Phe Pro Val Asp Leu Ser Asp Tyr	
1185 1190 1195 1200	
cct aag agc ttg cat atg tat gct aat aga ctc ctg gat cac aga gtc	3648
Pro Lys Ser Leu His Met Tyr Ala Asn Arg Leu Leu Asp His Arg Val	
1205 1210 1215	
cct caa aca gac atg act ttc cgg cac gtg ggt tcc aaa tta ata gtt	3696
Pro Gln Thr Asp Met Thr Phe Arg His Val Gly Ser Lys Leu Ile Val	
1220 1225 1230	
gca atg agc tca tgg ctt cag aag gca tct ggg agt ctt cct tat acc	3744
Ala Met Ser Ser Trp Leu Gln Lys Ala Ser Gly Ser Leu Pro Tyr Thr	
1235 1240 1245	
cag act ttg caa gac cac ctc aat agc ctg aag gag ttc aac ctc cag	3792
Gln Thr Leu Gln Asp His Leu Asn Ser Leu Lys Glu Phe Asn Leu Gln	
1250 1255 1260	
aac atg gga ttg cca gac tcc cac atc cca gaa aac ctc ttc tta aaa	3840
Asn Met Gly Leu Pro Asp Ser His Ile Pro Glu Asn Leu Phe Leu Lys	
1265 1270 1275 1280	
agc gat ggc cgc gtc aaa tat acc ttg aac aag aac agt ttg aaa att	3888
Ser Asp Gly Arg Val Lys Tyr Thr Leu Asn Lys Asn Ser Leu Lys Ile	
1285 1290 1295	
gag att cct ttg cct ttt ggt ggc aaa tcc tcc aga gat cta aag atg	3936
Glu Ile Pro Leu Pro Phe Gly Gly Lys Ser Ser Arg Asp Leu Lys Met	
1300 1305 1310	
tta gag act gtt agg aca cca gcc ctc cac ttc aag tct gtg gga ttc	3984
Leu Glu Thr Val Arg Thr Pro Ala Leu His Phe Lys Ser Val Gly Phe	
1315 1320 1325	
cat ctg cca tct cga gag ttc caa gtc cct act ttt acc att ccc aag	4032
His Leu Pro Ser Arg Glu Phe Gln Val Pro Thr Phe Thr Ile Pro Lys	
1330 1335 1340	
ttg tat caa ctg caa gtg cct ctc ctg ggt gtt cta gac ctc tcc acg	4080
Leu Tyr Gln Leu Gln Val Pro Leu Leu Gly Val Leu Asp Leu Ser Thr	
1345 1350 1355 1360	
aat gtc tac agc aac ttg tac aac tgg tcc gcc tcc tac agt ggt ggc	4128
Asn Val Tyr Ser Asn Leu Tyr Asn Trp Ser Ala Ser Tyr Ser Gly Gly	
1365 1370 1375	
aac acc agc aca gac cat ttc agc ctt cgg gct cgt tac cac atg aag	4176
Asn Thr Ser Thr Asp His Phe Ser Leu Arg Ala Arg Tyr His Met Lys	
1380 1385 1390	

gct gac tct gtg gtt gac ctg ctt tcc tac aat gtg caa gga tct gga	4224
Ala Asp Ser Val Val Asp Leu Leu Ser Tyr Asn Val Gln Gly Ser Gly	
1395 1400 1405	
gaa aca aca tat gac cac aag aat acg ttc aca cta tca tgt gat ggg	4272
Glu Thr Thr Tyr Asp His Lys Asn Thr Phe Thr Leu Ser Cys Asp Gly	
1410 1415 1420	
tct cta cgc cac aaa ttt cta gat tgc aat atc aaa ttc agt cat gta	4320
Ser Leu Arg His Lys Phe Leu Asp Ser Asn Ile Lys Phe Ser His Val	
1425 1430 1435 1440	
gaa aaa ctt gga aac aac cca gtc tca aaa ggt tta cta ata ttc gat	4368
Glu Lys Leu Gly Asn Asn Pro Val Ser Lys Gly Leu Leu Ile Phe Asp	
1445 1450 1455	
gca tct agt tcc tgg gga cca cag atg tct gct tca gtt cat ttg gac	4416
Ala Ser Ser Ser Trp Gly Pro Gln Met Ser Ala Ser Val His Leu Asp	
1460 1465 1470	
tcc aaa aag aaa cag cat ttg ttt gtc aaa gaa gtc aag att gat ggg	4464
Ser Lys Lys Lys Gln His Leu Phe Val Lys Glu Val Lys Ile Asp Gly	
1475 1480 1485	
cag ttc aga gtc tct tgc ttc tat gct aaa ggc aca tat ggc ctg tct	4512
Gln Phe Arg Val Ser Ser Phe Tyr Ala Lys Gly Thr Tyr Gly Leu Ser	
1490 1495 1500	
tgt cag agg gat cct aac act ggc cgg ctc aat gga gag tcc aac ctg	4560
Cys Gln Arg Asp Pro Asn Thr Gly Arg Leu Asn Gly Glu Ser Asn Leu	
1505 1510 1515 1520	
agg ttt aac tcc tcc tac ctc caa ggc acc aac cag ata aca gga aga	4608
Arg Phe Asn Ser Ser Tyr Leu Gln Gly Thr Asn Gln Ile Thr Gly Arg	
1525 1530 1535	
tat gaa gat gga acc ctc tcc ctc acc tcc acc tct gat ctg caa agt	4656
Tyr Glu Asp Gly Thr Leu Ser Leu Thr Ser Thr Ser Asp Leu Gln Ser	
1540 1545 1550	
ggc atc att aaa aat act gct tcc cta aag tat gag aac tac gag ctg	4704
Gly Ile Ile Lys Asn Thr Ala Ser Leu Lys Tyr Glu Asn Tyr Glu Leu	
1555 1560 1565	
act tta aaa tct gac acc aat ggg aag tat aag aac ttt gcc act tct	4752
Thr Leu Lys Ser Asp Thr Asn Gly Lys Tyr Lys Asn Phe Ala Thr Ser	
1570 1575 1580	
aac aag atg gat atg acc ttc tct aag caa aat gca ctg ctg cgt tct	4800
Asn Lys Met Asp Met Thr Phe Ser Lys Gln Asn Ala Leu Leu Arg Ser	
1585 1590 1595 1600	
gaa tat cag gct gat tac gag tca ttg agg ttc ttc agc ctg ctt tct	4848
Glu Tyr Gln Ala Asp Tyr Glu Ser Leu Arg Phe Phe Ser Leu Leu Ser	
1605 1610 1615	
gga tca cta aat tcc cat ggt ctt gag tta aat gct gac atc tta ggc	4896
Gly Ser Leu Asn Ser His Gly Leu Glu Leu Asn Ala Asp Ile Leu Gly	
1620 1625 1630	
act gac aaa att aat agt ggt gct cac aag gcg aca cta agg att ggc	4944

Thr Asp Lys Ile Asn Ser Gly Ala His Lys Ala Thr Leu Arg Ile Gly	
1635 1640 1645	
caa gat gga ata tct acc agt gca acg acc aac ttg aag tgt agt ctc	4992
Gln Asp Gly Ile Ser Thr Ser Ala Thr Thr Asn Leu Lys Cys Ser Leu	
1650 1655 1660	
ctg gtg ctg gag aat gag ctg aat gca gag ctt ggc ctc tct ggg gca	5040
Leu Val Leu Glu Asn Glu Leu Asn Ala Glu Leu Gly Leu Ser Gly Ala	
1665 1670 1675 1680	
tct atg aaa tta aca aca aat ggc cgc ttc agg gaa cac aat gca aaa	5088
Ser Met Lys Leu Thr Thr Asn Gly Arg Phe Arg Glu His Asn Ala Lys	
1685 1690 1695	
ttc agt ctg gat ggg aaa gcc gcc ctc aca gag cta tca ctg gga agt	5136
Phe Ser Leu Asp Gly Lys Ala Ala Leu Thr Glu Leu Ser Leu Gly Ser	
1700 1705 1710	
gct tat cag gcc atg att ctg ggt gtc gac agc aaa aac att ttc aac	5184
Ala Tyr Gln Ala Met Ile Leu Gly Val Asp Ser Lys Asn Ile Phe Asn	
1715 1720 1725	
ttc aag gtc agt caa gaa gga ctt aag ctc tca aat gac atg atg ggc	5232
Phe Lys Val Ser Gln Glu Gly Leu Lys Leu Ser Asn Asp Met Met Gly	
1730 1735 1740	
tca tat gct gaa atg aaa ttt gac cac aca aac agt ctg aac att gca	5280
Ser Tyr Ala Glu Met Lys Phe Asp His Thr Asn Ser Leu Asn Ile Ala	
1745 1750 1755 1760	
ggc tta tca ctg gac ttc tct tca aaa ctt gac aac att tac agc tct	5328
Gly Leu Ser Leu Asp Phe Ser Ser Lys Leu Asp Asn Ile Tyr Ser Ser	
1765 1770 1775	
gac aag ttt tat aag caa act gtt aat tta cag cta cag ccc tat tct	5376
Asp Lys Phe Tyr Lys Gln Thr Val Asn Leu Gln Leu Gln Pro Tyr Ser	
1780 1785 1790	
ctg gta act act tta aac agt gac ctg aaa tac aat gct ctg gat ctc	5424
Leu Val Thr Thr Leu Asn Ser Asp Leu Lys Tyr Asn Ala Leu Asp Leu	
1795 1800 1805	
acc aac aat ggg aaa cta cgg cta gaa ccc ctg aag ctg cat gtg gct	5472
Thr Asn Asn Gly Lys Leu Arg Leu Glu Pro Leu Lys Leu His Val Ala	
1810 1815 1820	
ggt aac cta aaa gga gcc tac caa aat aat gaa ata aaa cac atc tat	5520
Gly Asn Leu Lys Gly Ala Tyr Gln Asn Asn Glu Ile Lys His Ile Tyr	
1825 1830 1835 1840	
gcc atc tct tct gct gcc tta tca gca agc tat aaa gca gac act gtt	5568
Ala Ile Ser Ser Ala Ala Leu Ser Ala Ser Tyr Lys Ala Asp Thr Val	
1845 1850 1855	
gct aag gtt cag ggt gtg gag ttt agc cat ggg ctc aac aca gac atc	5616
Ala Lys Val Gln Gly Val Glu Phe Ser His Gly Leu Asn Thr Asp Ile	
1860 1865 1870	
gct ggg ctg gct tca gcc att gac atg agc aca aac tat aat tca gac	5664
Ala Gly Leu Ala Ser Ala Ile Asp Met Ser Thr Asn Tyr Asn Ser Asp	
1875 1880 1885	

tca	ctg	cat	ttc	agc	aat	gtc	ttc	cgt	tct	gta	atg	gcc	ccg	ttt	acc	5712
Ser	Leu	His	Phe	Ser	Asn	Val	Phe	Arg	Ser	Val	Met	Ala	Pro	Phe	Thr	
1890						1895				1900						
atg	acc	atc	gat	gca	cat	aca	aat	ggc	aat	ggg	aaa	ctc	gct	ctc	tgg	5760
Met	Thr	Ile	Asp	Ala	His	Thr	Asn	Gly	Asn	Gly	Lys	Leu	Ala	Leu	Trp	
1905					1910				1915						1920	
gga	gaa	cat	act	ggg	cag	ctg	tat	agc	aaa	ttc	ctg	ttg	aaa	gca	gaa	5808
Gly	Glu	His	Thr	Gly	Gln	Leu	Tyr	Ser	Lys	Phe	Leu	Leu	Lys	Ala	Glu	
				1925					1930					1935		
cct	ctg	gca	ttt	act	ttc	tct	cat	gat	tac	aaa	ggc	tcc	aca	agt	cat	5856
Pro	Leu	Ala	Phe	Thr	Phe	Ser	His	Asp	Tyr	Lys	Gly	Ser	Thr	Ser	His	
			1940					1945					1950			
cat	ctc	gtg	tct	agg	aaa	agc	atc	agt	gca	gct	ctt	gaa	cac	aaa	gtc	5904
His	Leu	Val	Ser	Arg	Lys	Ser	Ile	Ser	Ala	Ala	Leu	Glu	His	Lys	Val	
		1955					1960					1965				
agt	gcc	ctg	ctt	act	cca	gct	gag	cag	aca	ggc	acc	tgg	aaa	ctc	aag	5952
Ser	Ala	Leu	Leu	Thr	Pro	Ala	Glu	Gln	Thr	Gly	Thr	Trp	Lys	Leu	Lys	
	1970					1975					1980					
acc	caa	ttt	aac	aac	aat	gaa	tac	agc	cag	gac	ttg	gat	gct	tac	aac	6000
Thr	Gln	Phe	Asn	Asn	Asn	Glu	Tyr	Ser	Gln	Asp	Leu	Asp	Ala	Tyr	Asn	
1985					1990					1995					2000	
act	aaa	gat	aaa	att	ggc	gtg	gag	ctt	act	gga	cga	act	ctg	gct	gac	6048
Thr	Lys	Asp	Lys	Ile	Gly	Val	Glu	Leu	Thr	Gly	Arg	Thr	Leu	Ala	Asp	
				2005				2010						2015		
cta	act	cta	cta	gac	tcc	cca	att	aaa	gtg	cca	ctt	tta	ctc	agt	gag	6096
Leu	Thr	Leu	Leu	Asp	Ser	Pro	Ile	Lys	Val	Pro	Leu	Leu	Leu	Ser	Glu	
			2020					2025					2030			
ccc	atc	aat	atc	aat	gat	gct	tta	gag	atg	aga	gat	gcc	gtt	gag	aag	6144
Pro	Ile	Asn	Ile	Asn	Asp	Ala	Leu	Glu	Met	Arg	Asp	Ala	Val	Glu	Lys	
		2035				2040						2045				
ccc	caa	gaa	ttt	aca	att	gtt	gct	ttt	gta	aag	tat	gat	aaa	aac	caa	6192
Pro	Gln	Glu	Phe	Thr	Ile	Val	Ala	Phe	Val	Lys	Tyr	Asp	Lys	Asn	Gln	
	2050					2055					2060					
gat	gtt	cac	tcc	att	aac	ctc	cca	ttt	ttt	gag	acc	ttg	caa	gaa	tat	6240
Asp	Val	His	Ser	Ile	Asn	Leu	Pro	Phe	Phe	Glu	Thr	Leu	Gln	Glu	Tyr	
2065					2070					2075					2080	
ttt	gag	agg	aat	cga	caa	acc	att	ata	gtt	gta	ctg	gaa	aac	gta	cag	6288
Phe	Glu	Arg	Asn	Arg	Gln	Thr	Ile	Ile	Val	Val	Leu	Glu	Asn	Val	Gln	
				2085					2090					2095		
aga	aac	ctg	aag	cac	atc	aat	att	gat	caa	ttt	gta	aga	aaa	tac	aga	6336
Arg	Asn	Leu	Lys	His	Ile	Asn	Ile	Asp	Gln	Phe	Val	Arg	Lys	Tyr	Arg	
			2100					2105					2110			
gca	gcc	ctg	gga	aaa	ctc	cca	cag	caa	gct	aat	gat	tat	ctg	aat	tca	6384
Ala	Ala	Leu	Gly	Lys	Leu	Pro	Gln	Gln	Ala	Asn	Asp	Tyr	Leu	Asn	Ser	
		2115					2120					2125				
ttc	aat	tgg	gag	aga	caa	gtt	tca	cat	gcc	aag	gag	aaa	ctg	act	gct	6432

Phe Asn Trp Glu Arg Gln Val Ser His Ala Lys Glu Lys Leu Thr Ala	
2130	2135 2140
ctc aca aaa aag tat aga att aca gaa aat gat ata caa att gca tta	6480
Leu Thr Lys Lys Tyr Arg Ile Thr Glu Asn Asp Ile Gln Ile Ala Leu	
2145	2150 2155 2160
gat gat gcc aaa atc aac ttt aat gaa aaa cta tct caa ctg cag aca	6528
Asp Asp Ala Lys Ile Asn Phe Asn Glu Lys Leu Ser Gln Leu Gln Thr	
2165	2170 2175
tat atg ata caa ttt gat cag tat att aaa gat agt tat gat tta cat	6576
Tyr Met Ile Gln Phe Asp Gln Tyr Ile Lys Asp Ser Tyr Asp Leu His	
2180	2185 2190
gat ttg aaa ata gct att gct aat att att gat gaa atc att gaa aaa	6624
Asp Leu Lys Ile Ala Ile Ala Asn Ile Ile Asp Glu Ile Ile Glu Lys	
2195	2200 2205
tta aaa agt ctt gat gag cac tat cat acc cgt gta aat tta gta aaa	6672
Leu Lys Ser Leu Asp Glu His Tyr His Thr Arg Val Asn Leu Val Lys	
2210	2215 2220
aca atc cat gat cta cat ttg ttt att gaa aat att gat ttt aac aaa	6720
Thr Ile His Asp Leu His Leu Phe Ile Glu Asn Ile Asp Phe Asn Lys	
2225	2230 2235 2240
agt gga agt agt act gca tcc tgg att caa aat gtg gat act aag tac	6768
Ser Gly Ser Ser Thr Ala Ser Trp Ile Gln Asn Val Asp Thr Lys Tyr	
2245	2250 2255
caa atc aga atc cag ata caa gaa aaa ctg cag cag ctt aag aga cac	6816
Gln Ile Arg Ile Gln Ile Gln Glu Lys Leu Gln Gln Leu Lys Arg His	
2260	2265 2270
ata cag aat ata gac atc cag cac cta gct gga aag tta aaa caa cac	6864
Ile Gln Asn Ile Asp Ile Gln His Leu Ala Gly Lys Leu Lys Gln His	
2275	2280 2285
att gag gct att gat gtt aga gtg ctt tta gat caa ttg gga act aca	6912
Ile Glu Ala Ile Asp Val Arg Val Leu Leu Asp Gln Leu Gly Thr Thr	
2290	2295 2300
att tca ttt gaa aga ata aat gat gtt ctt gag cat gtc aaa cac ttt	6960
Ile Ser Phe Glu Arg Ile Asn Asp Val Leu Glu His Val Lys His Phe	
2305	2310 2315 2320
gtt ata aat ctt att ggg gat ttt gaa gta gct gag aaa atc aat gcc	7008
Val Ile Asn Leu Ile Gly Asp Phe Glu Val Ala Glu Lys Ile Asn Ala	
2325	2330 2335
ttc aga gcc aaa gtc cat gag tta atc gag agg tat gaa gta gac caa	7056
Phe Arg Ala Lys Val His Glu Leu Ile Glu Arg Tyr Glu Val Asp Gln	
2340	2345 2350
caa atc cag gtt tta atg gat aaa tta gta gag ttg gcc cac caa tac	7104
Gln Ile Gln Val Leu Met Asp Lys Leu Val Glu Leu Ala His Gln Tyr	
2355	2360 2365
aag ttg aag gag act att cag aag cta agc aat gtc cta caa caa gtt	7152
Lys Leu Lys Glu Thr Ile Gln Lys Leu Ser Asn Val Leu Gln Gln Val	
2370	2375 2380

aag ata aaa gat tac ttt gag aaa ttg gtt gga ttt att gat gat gct Lys Ile Lys Asp Tyr Phe Glu Lys Leu Val Gly Phe Ile Asp Asp Ala 2385 2390 2395 2400	7200
gtc aag aag ctt aat gaa tta tct ttt aaa aca ttc att gaa gat gtt Val Lys Lys Leu Asn Glu Leu Ser Phe Lys Thr Phe Ile Glu Asp Val 2405 2410 2415	7248
aac aaa ttc ctt gac atg ttg ata aag aaa tta aag tca ttt gat tac Asn Lys Phe Leu Asp Met Leu Ile Lys Lys Leu Lys Ser Phe Asp Tyr 2420 2425 2430	7296
cac cag ttt gta gat gaa acc aat gac aaa atc cgt gag gtg act cag His Gln Phe Val Asp Glu Thr Asn Asp Lys Ile Arg Glu Val Thr Gln 2435 2440 2445	7344
aga ctc aat ggt gaa att cag gct ctg gaa cta cca caa aaa gct gaa Arg Leu Asn Gly Glu Ile Gln Ala Leu Glu Leu Pro Gln Lys Ala Glu 2450 2455 2460	7392
gca tta aaa ctg ttt tta gag gaa acc aag gcc aca gtt gca gtg tat Ala Leu Lys Leu Phe Leu Glu Glu Thr Lys Ala Thr Val Ala Val Tyr 2465 2470 2475 2480	7440
ctg gaa agc cta cag gac acc aaa ata acc tta atc atc aat tgg tta Leu Glu Ser Leu Gln Asp Thr Lys Ile Thr Leu Ile Ile Asn Trp Leu 2485 2490 2495	7488
cag gag gct tta agt tca gca tct ttg gct cac atg aag gcc aaa ttc Gln Glu Ala Leu Ser Ser Ala Ser Leu Ala His Met Lys Ala Lys Phe 2500 2505 2510	7536
cga gag act cta gaa gat aca cga gac cga atg tat caa atg gac att Arg Glu Thr Leu Glu Asp Thr Arg Asp Arg Met Tyr Gln Met Asp Ile 2515 2520 2525	7584
cag cag gaa ctt caa cga tac ctg tct ctg gta ggc cag gtt tat agc Gln Gln Glu Leu Gln Arg Tyr Leu Ser Leu Val Gly Gln Val Tyr Ser 2530 2535 2540	7632
aca ctt gtc acc tac att tct gat tgg tgg act ctt gct gct aag aac Thr Leu Val Thr Tyr Ile Ser Asp Trp Trp Thr Leu Ala Ala Lys Asn 2545 2550 2555 2560	7680
ctt act gac ttt gca gag caa tat tct atc caa gat tgg gct aaa cgt Leu Thr Asp Phe Ala Glu Gln Tyr Ser Ile Gln Asp Trp Ala Lys Arg 2565 2570 2575	7728
atg aaa gca ttg gta gag caa ggg ttc act gtt cct gaa atc aag acc Met Lys Ala Leu Val Glu Gln Gly Phe Thr Val Pro Glu Ile Lys Thr 2580 2585 2590	7776
atc ctt ggg acc atg cct gcc ttt gaa gtc agt ctt cag gct ctt cag Ile Leu Gly Thr Met Pro Ala Phe Glu Val Ser Leu Gln Ala Leu Gln 2595 2600 2605	7824
aaa gct acc ttc cag aca cct gat ttt ata gtc ccc cta aca gat ttg Lys Ala Thr Phe Gln Thr Pro Asp Phe Ile Val Pro Leu Thr Asp Leu 2610 2615 2620	7872
agg att cca tca gtt cag ata aac ttc aaa gac tta aaa aat ata aaa	7920



ctt acc ctg gat agc aac act aaa tac ttc cac aaa ttg aac atc ccc	8688
Leu Thr Leu Asp Ser Asn Thr Lys Tyr Phe His Lys Leu Asn Ile Pro	
2885 2890 2895	
aaa ctg gac ttc tct agt cag gct gac ctg cgc aac gag atc aag aca	8736
Lys Leu Asp Phe Ser Ser Gln Ala Asp Leu Arg Asn Glu Ile Lys Thr	
2900 2905 2910	
ctg ttg aaa gct ggc cac ata gca tgg act tct tct gga aaa ggg tca	8784
Leu Leu Lys Ala Gly His Ile Ala Trp Thr Ser Ser Gly Lys Gly Ser	
2915 2920 2925	
tgg aaa tgg gcc tcg ccc aga ttc tca gat gag gga aca cat gaa tca	8832
Trp Lys Trp Ala Ser Pro Arg Phe Ser Asp Glu Gly Thr His Glu Ser	
2930 2935 2940	
caa att agt ttc acc ata gaa gga ccc ctc act tcc ttt gga ctg tcc	8880
Gln Ile Ser Phe Thr Ile Glu Gly Pro Leu Thr Ser Phe Gly Leu Ser	
2945 2950 2955 2960	
aat aag atc aat agc aaa cac cta aga gta aac caa aac ttg gtt tat	8928
Asn Lys Ile Asn Ser Lys His Leu Arg Val Asn Gln Asn Leu Val Tyr	
2965 2970 2975	
gaa tct ggc tcc ctc aac ttt tct aaa ctt gaa att caa tca caa gtc	8976
Glu Ser Gly Ser Leu Asn Phe Ser Lys Leu Glu Ile Gln Ser Gln Val	
2980 2985 2990	
gat tcc cag cat gtg ggc cac agt gtt cta act gct aaa ggc atg gca	9024
Asp Ser Gln His Val Gly His Ser Val Leu Thr Ala Lys Gly Met Ala	
2995 3000 3005	
ctg ttt gga gaa ggg aag gca gag ttt act ggg agg cat gat gct cat	9072
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Ala Gln Pro Phe Glu Ile Thr Ala Ser Thr Asn Asn Glu Gly Asn Leu	
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Lys Val Arg Phe Pro Leu Arg Leu Thr Gly Lys Ile Asp Phe Leu Asn	
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Asn Tyr Ala Leu Phe Leu Ser Pro Ser Ala Gln Gln Ala Ser Trp Gln	
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Val Ser Ala Arg Phe Asn Gln Tyr Lys Tyr Asn Gln Asn Phe Ser Ala	
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Gly Asn Asn Glu Asn Ile Met Glu Ala His Val Gly Ile Asn Gly Glu	
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Leu Pro Tyr Thr Ile Ile Thr Thr Pro Pro Leu Lys Asp Phe Ser Leu	
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Trp Glu Lys Thr Gly Leu Lys Glu Phe Leu Lys Thr Thr Lys Gln Ser	
3155 3160 3165	
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Phe Asp Leu Ser Val Lys Ala Gln Tyr Lys Lys Asn Lys His Arg His	
3170 3175 3180	
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Ser Ile Thr Asn Pro Leu Ala Val Leu Cys Glu Phe Ile Ser Gln Ser	
3185 3190 3195 3200	
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Ile Lys Ser Phe Asp Arg His Phe Glu Lys Asn Arg Asn Asn Ala Leu	
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Asp Phe Val Thr Lys Ser Tyr Asn Glu Thr Lys Ile Lys Phe Asp Lys	
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Tyr Lys Ala Glu Lys Ser His Asp Glu Leu Pro Arg Thr Phe Gln Ile	
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Asp Ile Val Ala His Leu Leu Ser Ser Ser Ser Ser Val Ile Asp Ala	

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